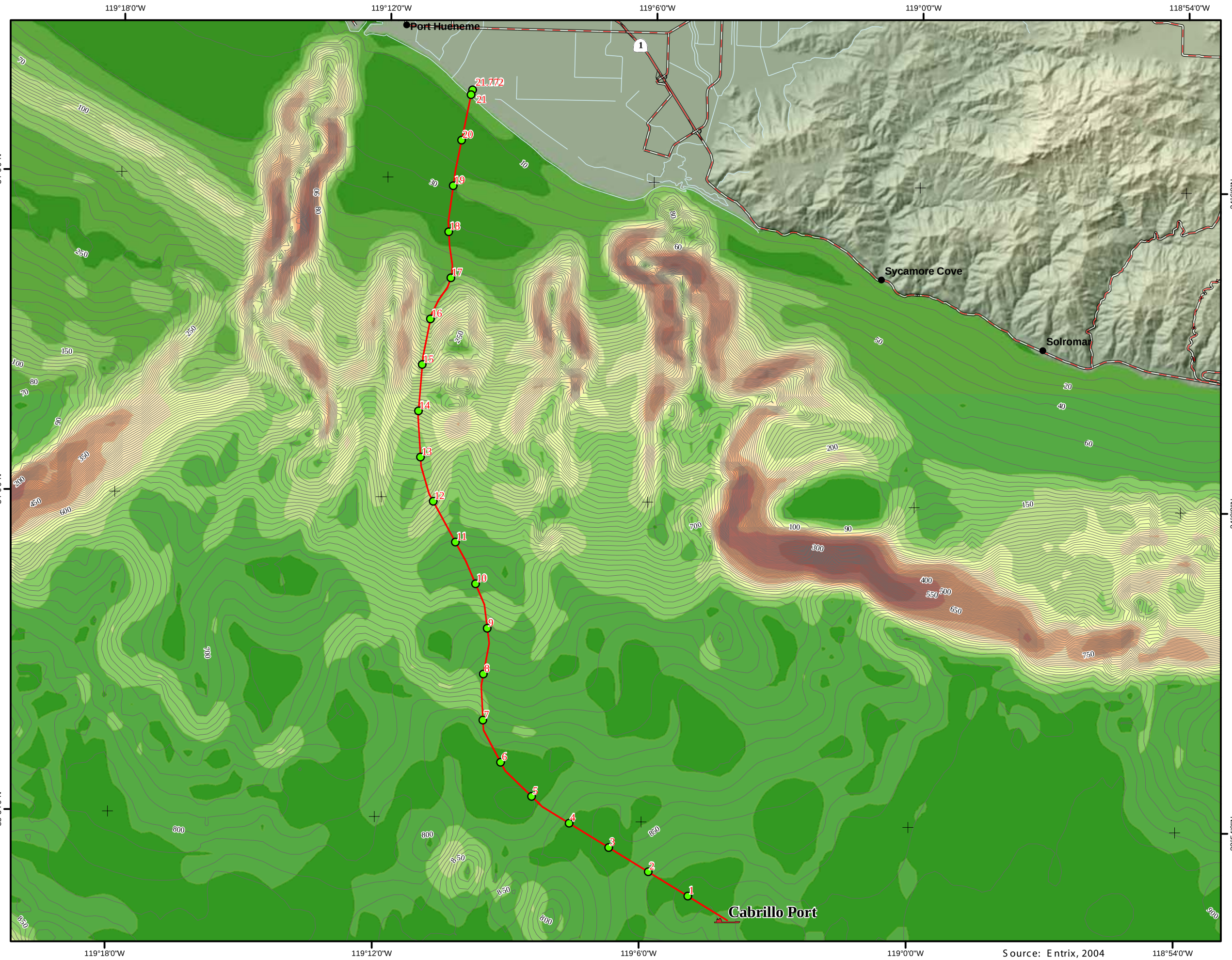


Cabrillo Port Mooring Point

Milepost

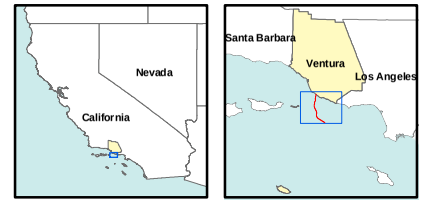
Cabrillo Port Pipeline Route

Bathymetry contour 10 meter

Bathymetry Slope (Degrees)

- 0.00 - 0.68
- 0.69 - 2.03
- 2.04 - 3.83
- 3.84 - 5.86
- 5.87 - 8.00
- 8.01 - 10.26
- 10.27 - 12.74
- 12.75 - 15.89
- 15.90 - 20.18
- 20.19 - 28.86

Sources: Fugro



2 1 0 2 Miles

NAD27 UTM Zone 11

Cabrillo Port LNG Deepwater Port
EIS/EIR, 2004

Figure 4.11-2
Seabed Slope Gradients in Project Area

d:\gis\entrix\3068505\map\bhplng_capt_seabdslope_17i11i_01.mxd 4/3/2003 3:04:14 PM zder

Miocene strata in the Ventura Basin or equivalent age are known as the Santa Margarita or Modelo Formation. Extrusive and intrusive sequences of basaltic, andesitic, and rhyolitic volcanic rocks of lower to middle Miocene age also occur.

- *Pliocene Rocks:* Pliocene sedimentary rocks consist of interbedded sandstone, siltstone, mudstone, and conglomerate of the Repetto and Pico Formations (each lithologically indistinct from one another). These rocks, which are extremely thick along the axis of the Ventura Basin, have been primary oil producers within the Basin.
- *Pleistocene Deposits:* Pleistocene sedimentary deposits in the Ventura Basin-Santa Barbara Channel area consist of Santa Barbara Formation (part Pliocene in age), San Pedro Formation (lower Pleistocene), and unnamed beds of upper Pleistocene age. The Santa Barbara Formation is composed of marine and nonmarine interbedded mudstone, siltstone, sandstone, and conglomerate. The San Pedro Formation in the Oxnard Plain area consists of marine and nonmarine interbedded mudstone, sandstone, siltstone, and conglomerate. Coarser-grained faces of this formation near the top and bottom of the unit have been termed the Hueneme and Fox Canyon aquifers in the Ventura-Oxnard area. The unnamed upper Pleistocene deposits in the Oxnard Plain area consist of marine and nonmarine sand, gravel, clay, and alluvium, which unconformably overlie the San Pedro Formation.
- *Holocene Deposits:* Unconsolidated and poorly consolidated Holocene sediments cover the Oxnard Plain and most of the Hueneme-Mugu Shelf and adjacent Oxnard Shelf. These deposits consist of sand, gravel, silt, clay, and mudstone with local concentrations of cobbles and boulders, lenses of carbonaceous material, peat, and shell debris. On the Oxnard and Hueneme-Mugu Shelves, the Holocene deposits generally grade from sand in the nearshore area to silt and clay on the outer shelf or slope (Figure 4.11-3). The geologic map of the Center Road Pipeline and alternatives show that the facilities will be located on Quaternary alluvium and nonmarine terrace deposits (Figure 4.11-4). The geologic map for the Line 225 Pipeline Loop route also show that the pipeline will be on Quaternary alluvium and nonmarine terrace deposits, except for the last 0.5 mile (0.8 km), which will be on Plio-Pleistocene nonmarine rocks (Figure 4.11-5).

The offshore Project pipeline would be placed on a wide ridge or levee top on the Hueneme-Mugu Slope (MP 14 to 17, as shown on Figures 4.11-2 and 4.11-6). As such, the Project pipeline is expected to rest on a thin layer (perhaps less than 3 feet [1 m] thick) of Holocene mud directly overlying lower Pleistocene San Pedro Formation, consisting of marine and terrestrial clay, sand, silt, and small amounts of conglomerates.

Offshore, the Project is within a part of the Santa Monica Basin that is underlain by Hueneme Fan deposits (MP 0 to 14). These deposits largely reflect continued deposition of sediment being transported from the Hueneme-Mugu Shelf through the Hueneme and Mugu Canyons by turbidity currents. Based on seismic reflection data,

this part of the basin is underlain by Holocene and Pleistocene fan deposits, Pleistocene marine and nonmarine interbedded mudstone, siltstone, sandstone associated with the Santa Barbara Formation and San Pedro Formation, and other Pliocene and Miocene strata (Greene et al. 1978 as referenced by Entrix, August 2003). Based on seafloor sediment samples collected throughout the Project area, Holocene sediment primarily consists of fine silt and clay.

At the planned mooring location, the lower fan is nearly flat (with gradients of less than 0.15 degrees) and merges with the smooth and featureless Santa Monica Basin.

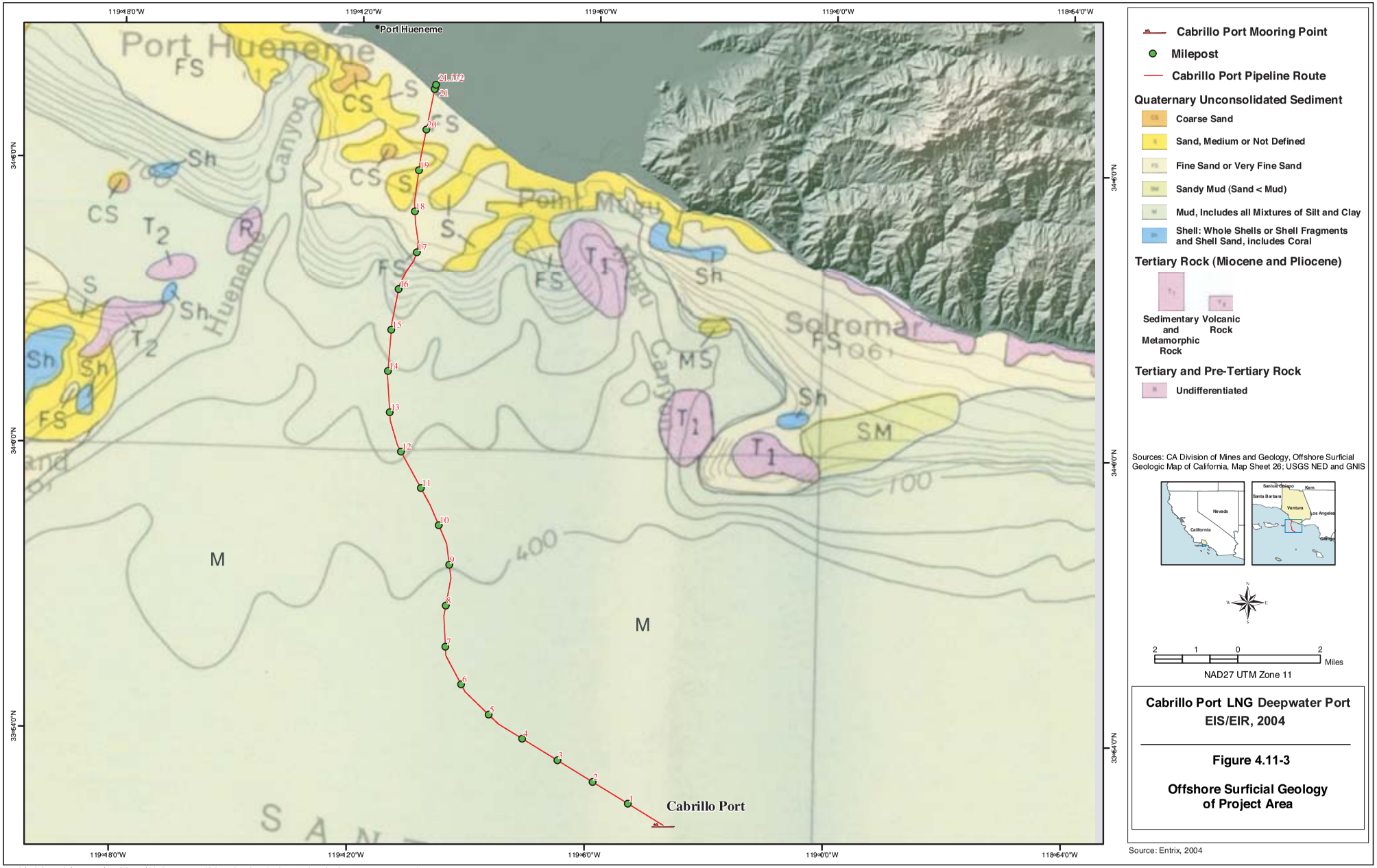
Faults and Seismicity

Southern California is considered very seismically active. The state of California considers a fault segment historically active if it has generated earthquakes accompanied by surface rupture during historic time, i.e., approximately the last 200 years. A fault that shows evidence of movement within Holocene time (approximately the last 11,000 years) is defined as active. A fault segment is considered potentially active if there is evidence of displacement during Quaternary time or approximately the last 2,000,000 years (Hart and Bryant 1997).

A California State Lands Commission (CSLC) and Minerals Management Service (MMS) report documents the offshore seismic risk in the Santa Barbara Channel (Foxall et al. 1995; Foxall et al. 1996). A preliminary seismic hazard evaluation was completed that included some technical modeling (Fugro June 2004). General information from that report has been incorporated into this document.

Some of the major active or potentially active nearby faults include the Malibu Coast Fault, Anacapa/Dume Fault, Holser Fault, Pitas Point-Ventura Fault, Oak Ridge Fault, Simi-Santa Rosa Fault, San Gabriel, and Santa Cruz Island Fault.

The geology map seen in Figure 4.11-6 shows the offshore Project pipelines possibly crossing the Malibu Coast Fault and the Anacapa/Dume Fault between MP 10.6 and 11.6. These faults appear to be related to the Santa Cruz Island Fault. A recent report by the United States Geological Survey (USGS) indicates that that the pipelines connecting from the Cabrillo Port would cross a major east-west fault system that includes, among others, the Santa Cruz Island Fault, the Anacapa-Dume Fault, and the Malibu Coast Fault; the Anacapa-Dume Fault has the potential for producing the largest earthquakes in the region, up to magnitude (M) 7.5 (USGS 2004). The Bailey Fault (approximately 2 miles [3.2 km] east of MP 16) appears to be an inactive fault, which extends inland from the Mugu Lagoon area. A fault along the axis of Hueneme Canyon (approximately 3 miles [4.8 km] west of MP 19) trends northwest-southeast for about 3 miles (4.8 km); this fault appears to be inactive, displacing strata no younger than Miocene in age. No surface evidence of these faults is known, nor have any recorded earthquakes been attributed to them. Epicenters from historical earthquakes over the last 200 years in the Project area greater than M 5 are shown on Figure 4.11-7.



Cabrillo Port LNG Deepwater Port EIS/EIR, 2004

Figure 4.11-3

Offshore Surficial Geology of Project Area

Source: Entrix, 2004

d:\gis\entrix\3068505\map\image\bhplng_capt_offshsurfgeol_17i11i_03.mxd 4/18/2003 6:42:55 PM zder